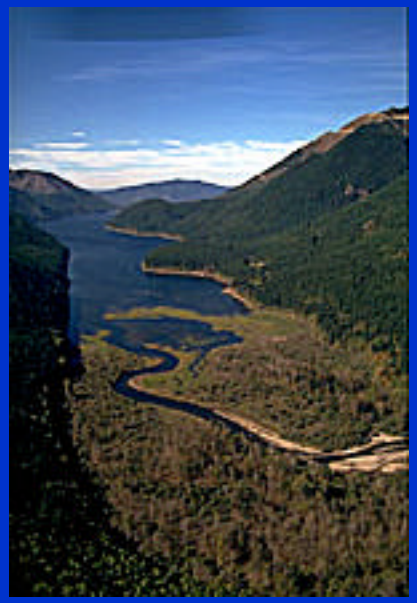
WASHINGTON STATE UNIVERSITY
EXTENSION

World Class. Face to Face.



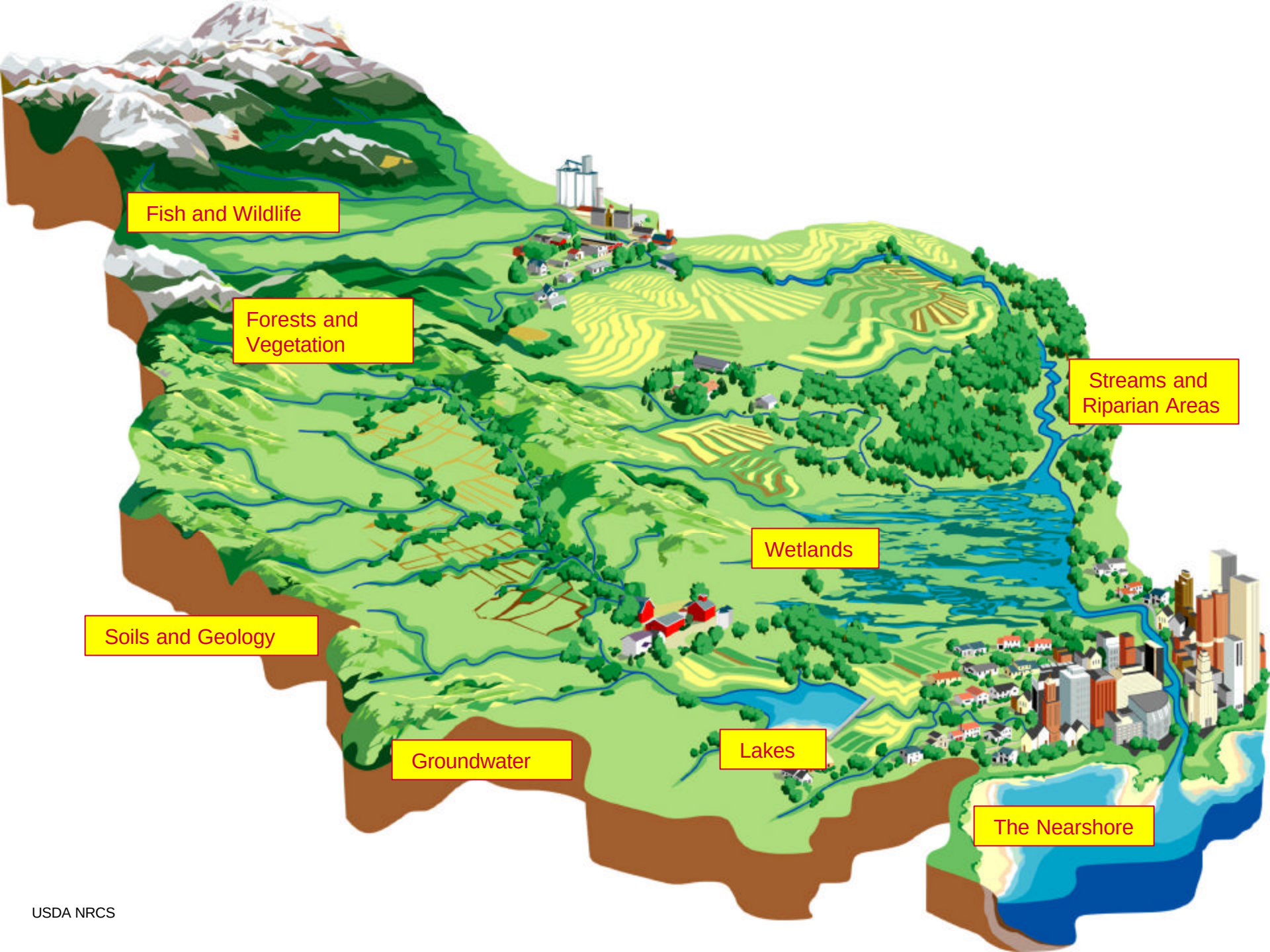
Watersheds, the Water-Cycle, and You

WSU Extension

King County

Watersheds, the Water-Cycle and You

- What is a Watershed
- The Water-Cycle
- **Natural Watershed Features**
  - **Soils**
  - **Groundwater**
  - **Streams and Riparian Areas**
  - **Wetlands**
  - **Lakes**
  - **The Nearshore**
  - **Forests and Vegetation**
  - **Fish and Wildlife**
- Humans and Watersheds


Fish and Wildlife
Forests and Vegetation
Streams and Riparian Areas
Wetlands
Soils and Geology
Groundwater
Lakes
The Nearshore

USDA NRCS

Soils

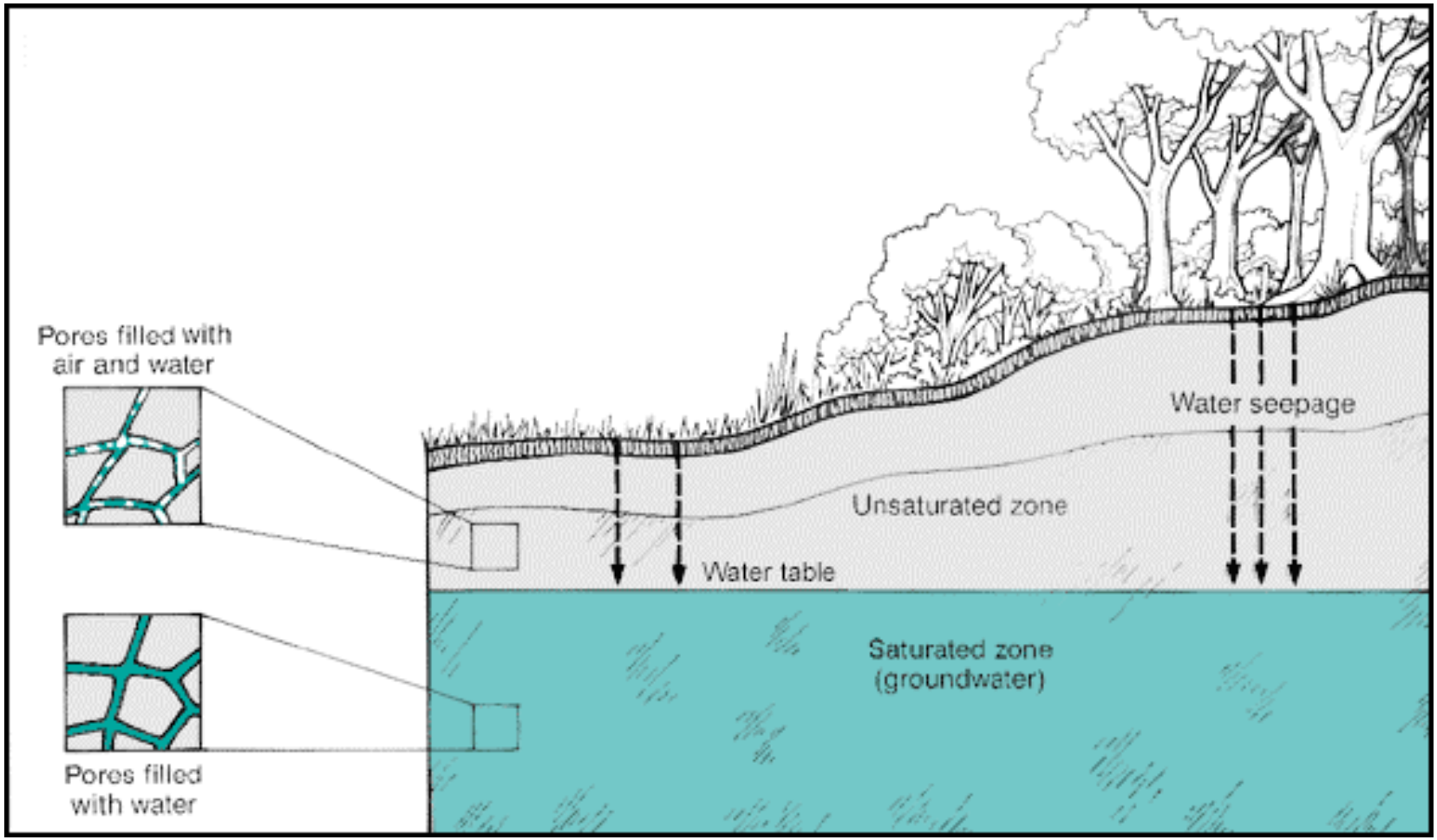
- Formation and Geological Impacts
- Types
- Role in the Water-Cycle

Groundwater

- What it is
- Where it goes
- Role in the water-cycle.

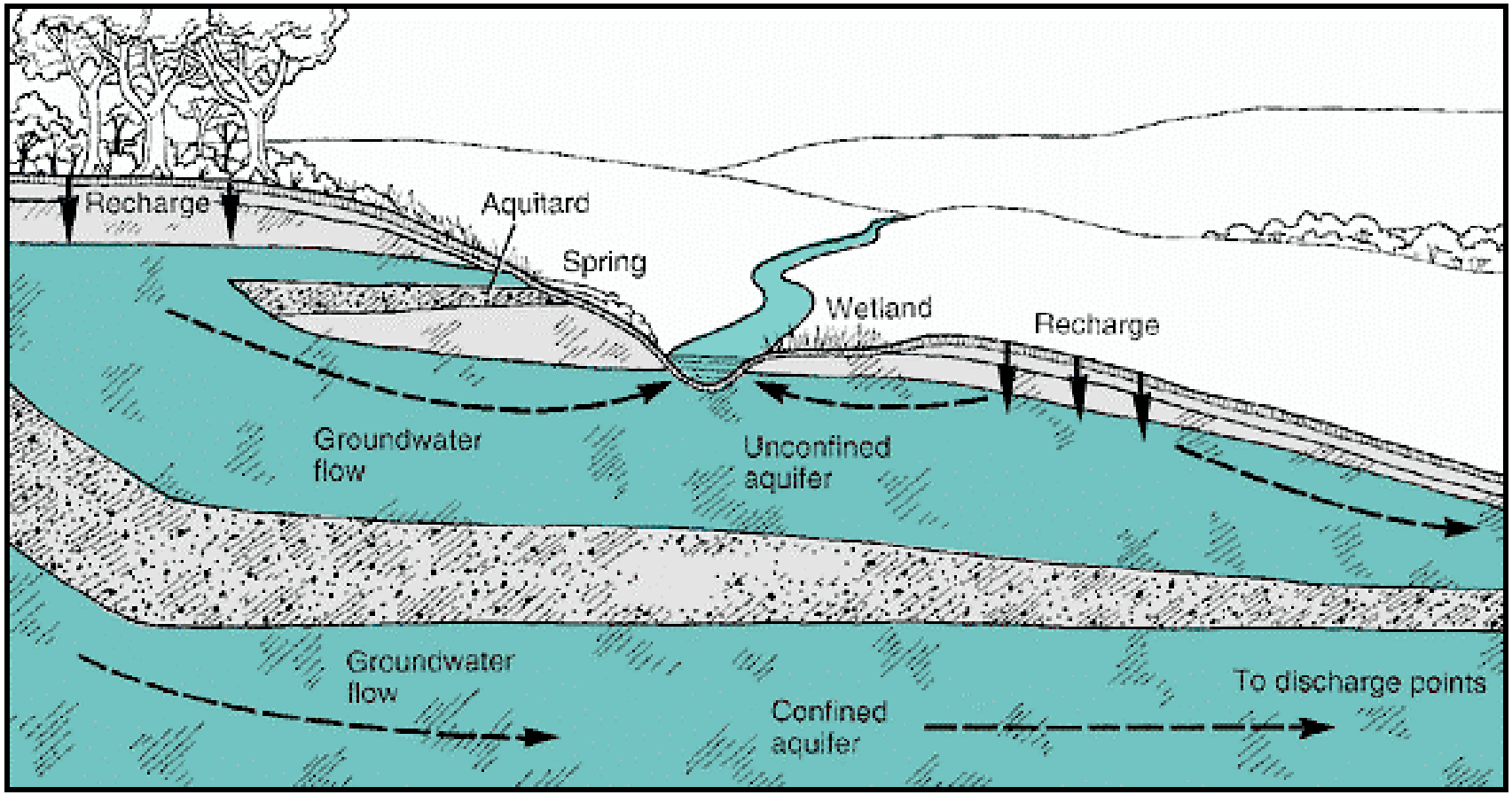
From http://www.cwac.net/groundwater/

What is Groundwater



Graphic credit: League of Women Voters of Pennsylvania Citizen Education Fund

Where Groundwater Goes



Graphic: League of Women Voters of Pennsylvania Citizen Education Fund

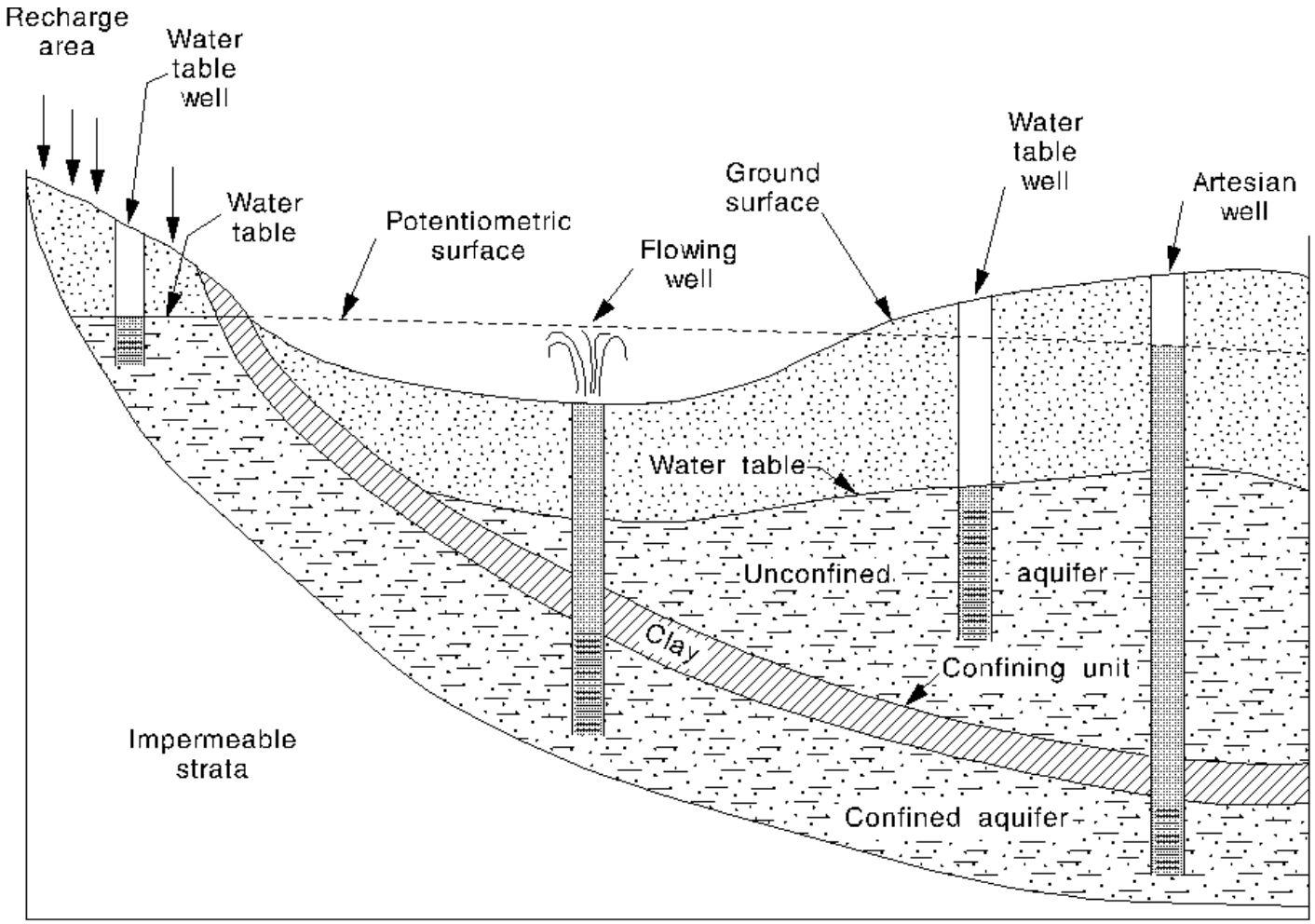


Figure courtesy of USGS

Unconfined and confined ground-water conditions.

Groundwater's Role in the Water-Cycle

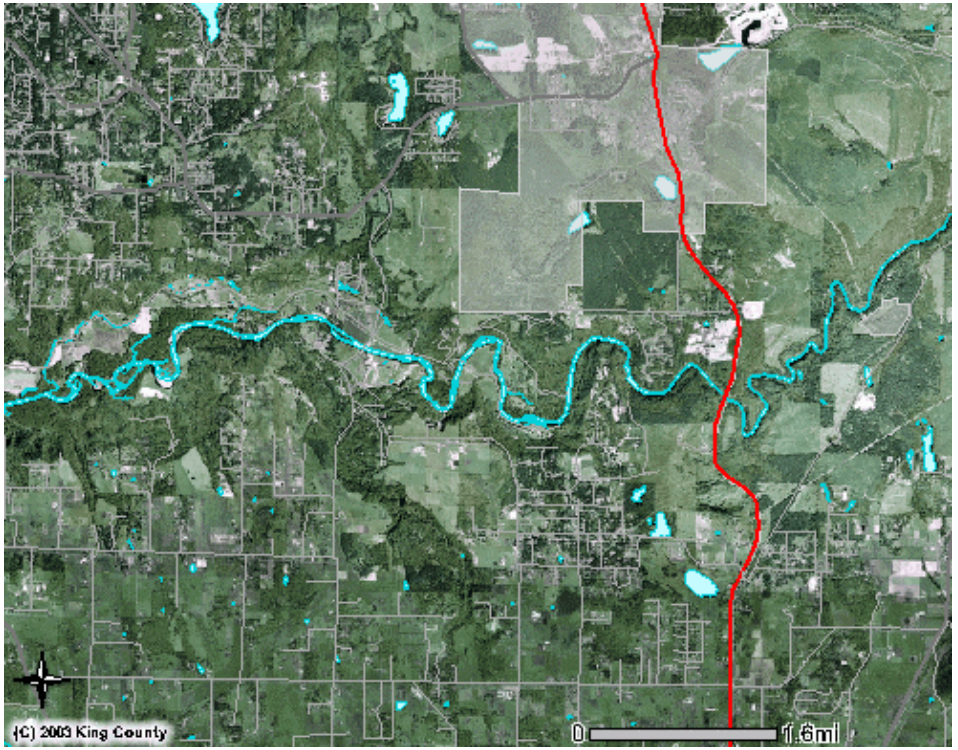
- Conduit and reservoir
- Source of stream, wetland, and lake water
- Water purification
- Dry season stream flow

Streams and Riparian Areas:

- What they are,
- What they look like when in a healthy condition,
- The functions and values they provide to a watershed.

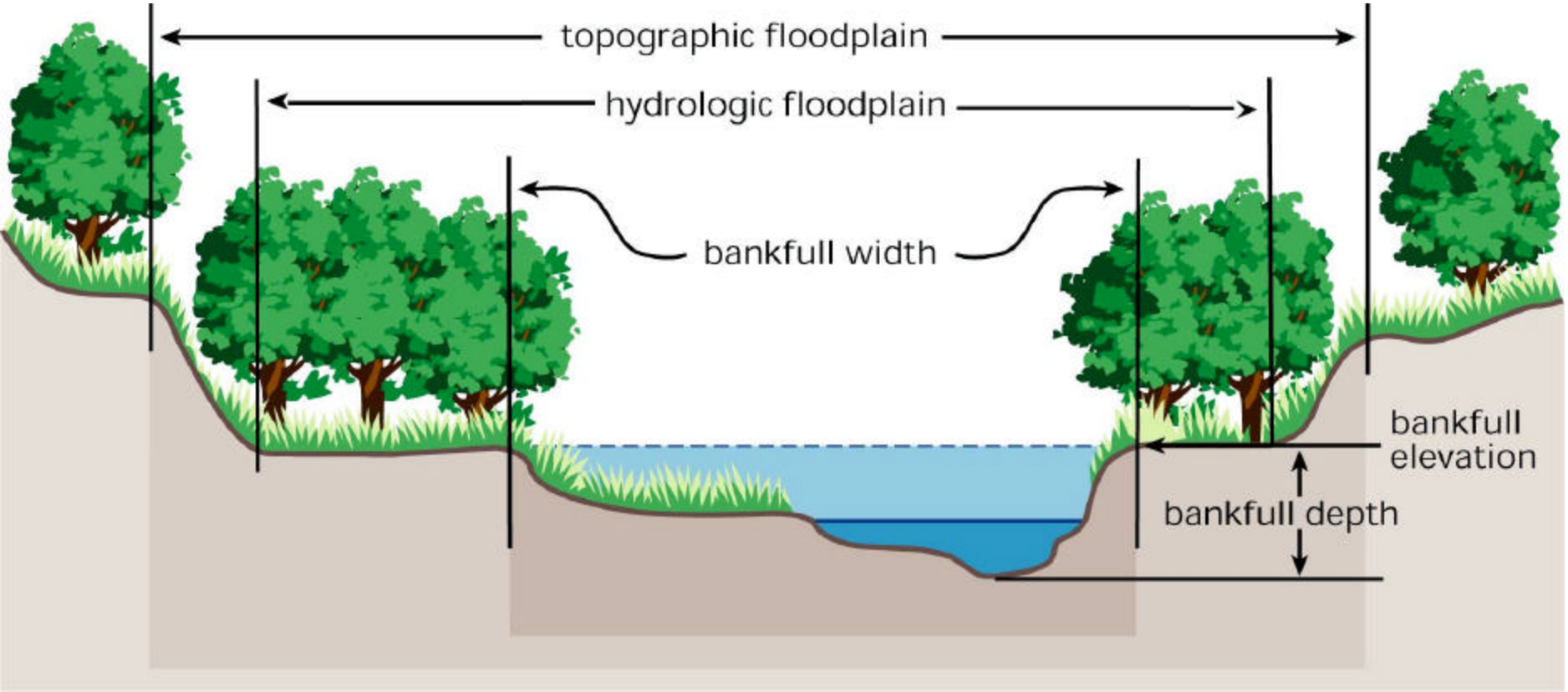
Streams: What They Are/how they form

- Water flows:
  - In the stream channel
  - Just below the surface (the hyporheic zone)
  - On the flood plain
- Channel formation:
  - Erosion
  - Transition
  - Deposition



From http://www.metrokc.gov/gis/mapportal/iMAP_main.htm

Stream channel/flood plain graphic



What a Healthy Stream Looks Like

- Channel meanders
- Flood plain/overflow channels
- Balance of flow, sediment, and large wood
- Diverse biological life
- Good water quality

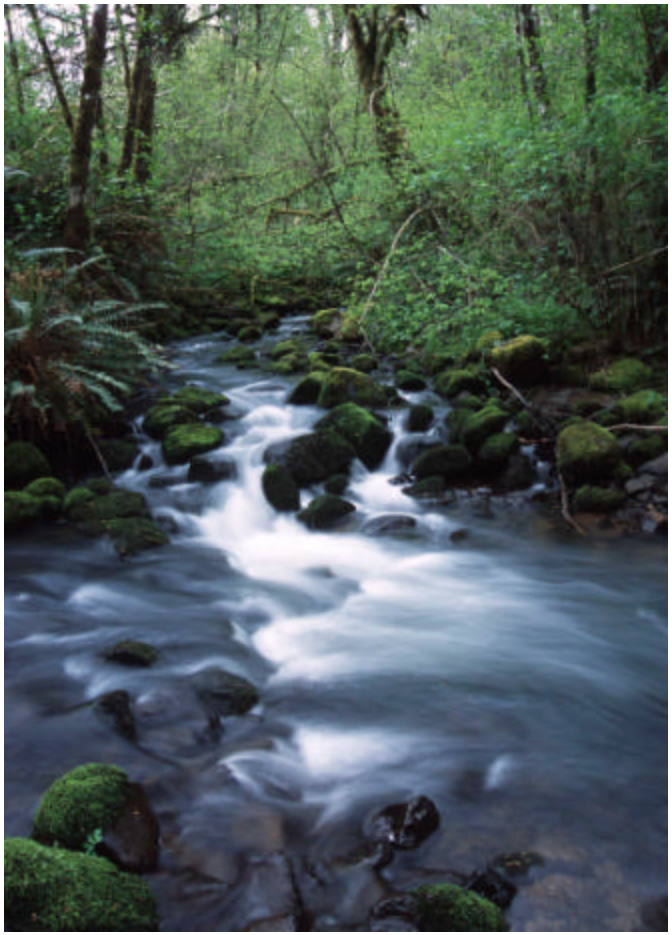


Photo courtesy of USDA-NRCS

What A Healthy Stream Does

- Hold sediment
- Store Water and Slow/reduce floods
- Maintains Water Quality
- Provides fish/wildlife habitat

Riparian Areas

- **Transition area between aquatic and upland zones**

Courtesy of USDA-NRCS

What Healthy Riparian Land Looks Like

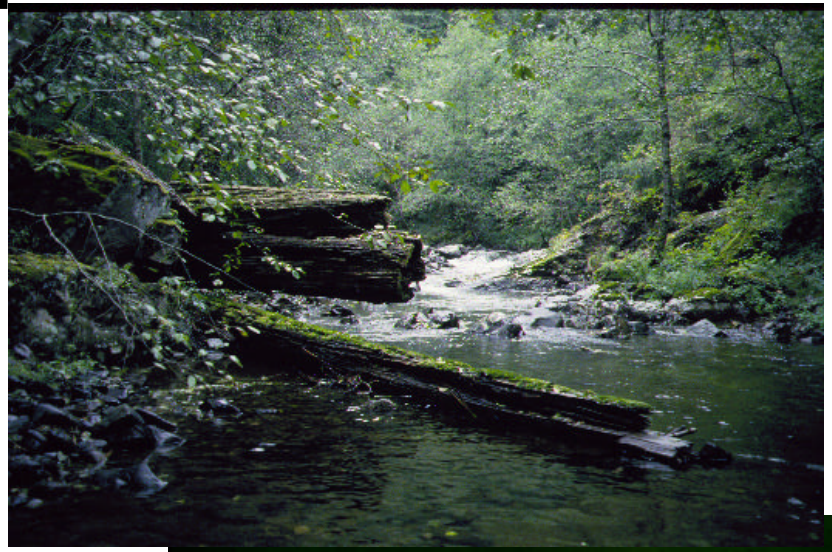
- Deeply rooted native vegetation
- Structural diversity in and near streams
- Diverse and abundant fish and wildlife
- High water table and increase water storage capacity

From Stream Corridor Restoration: Principles, Processes, and Practices, 10/98.

From “Hydrology for Land/Water Stewards”, Jeff Burkey, King County DNRP

What Healthy Riparian Land Does

- Supply nutrients
- Filter sediments/pollutants
- Shade/cool water
- Stabilize bank
- Store water/reduce flooding
- Provide fish/wildlife habitat
- Recharge aquifer
- Maintain stream flows



Wetlands

- What is a wetland?
- What a healthy wetland looks like.
- What a healthy wetland does.

What is a Wetland?

- Wetlands generally include swamps, marshes, bogs, and similar areas.
- Wetlands are technically defined and have legal implications



What Makes A Wetland?

- Hydrology (water)
- Soil (water-influenced or hydric)
- Vegetation (plants)

Courtesy of USDA-NRCS

Functions/Values of Healthy Wetlands

- **Water quality**
- **Hydrologic (water movement)**
- **Wildlife habitat and food web**
- **Cultural and social**
- **Economic worth**

Photos Courtesy
USDA-NRCS



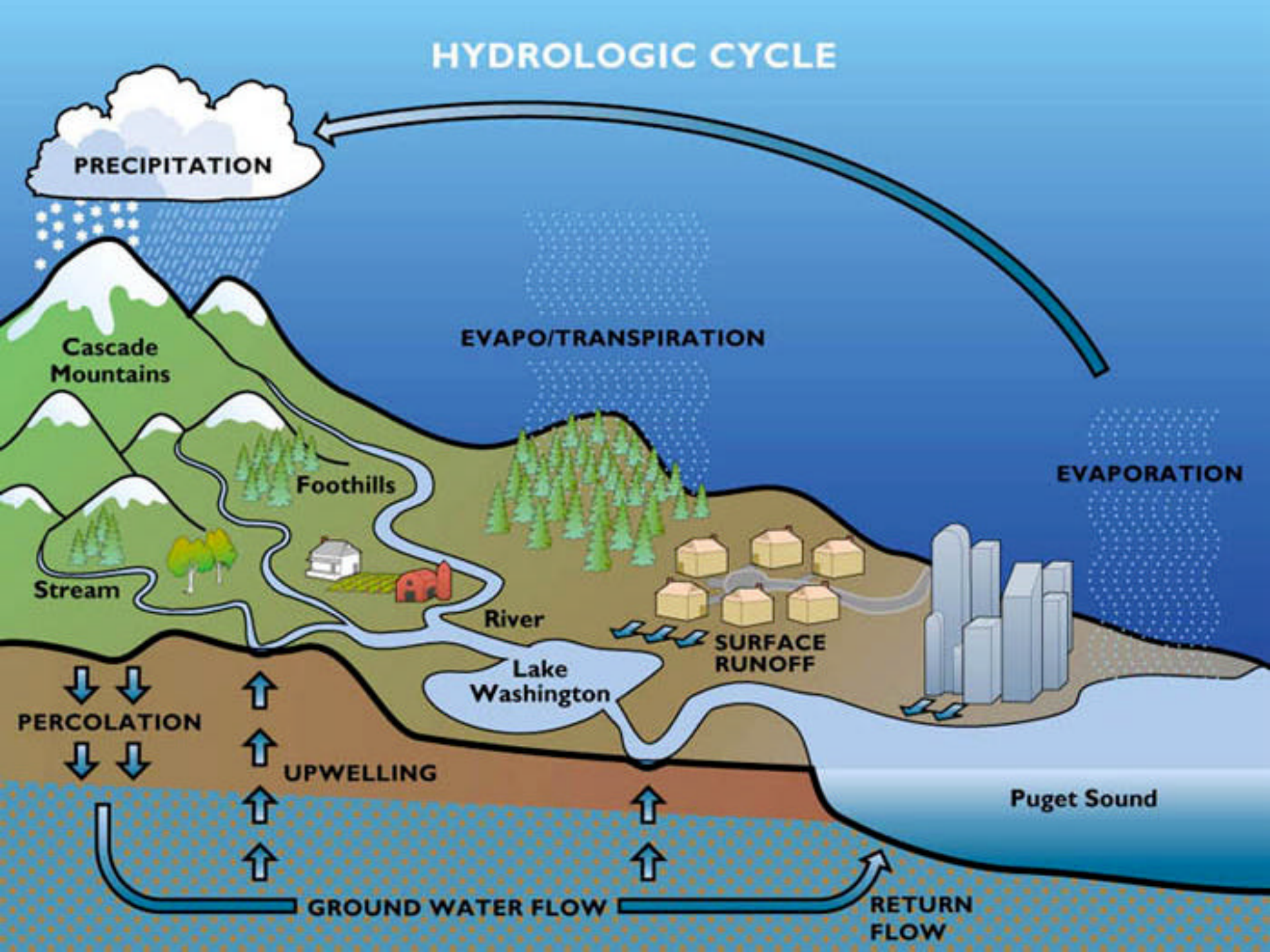
Understanding Lake Ecology

- Formation
- Function
- Health

Source: The Washington Lake Book
http://www.ecy.wa.gov/programs/wq/plants/lakes/characteristics.html

Formation

- Geological – glaciers made most lakes
- Humans – man-made lakes and reservoirs
- Animals – damming rivers and streams

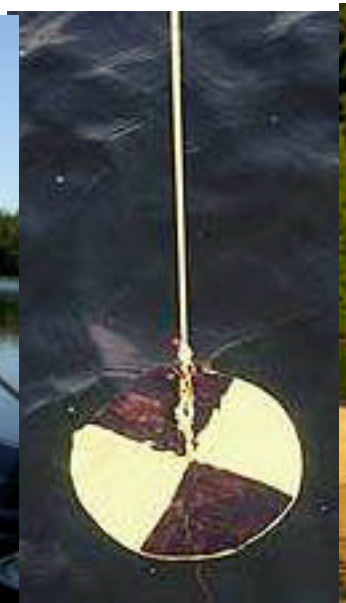

HYDROLOGIC CYCLE
PRECIPITATION
EVAPO/TRANSPIRATION
EVAPORATION
Cascade Mountains
Foothills
Stream
River
Lake Washington
SURFACE RUNOFF
PERCOLATION
UPWELLING
Puget Sound
GROUND WATER FLOW
RETURN FLOW

Lake Processes

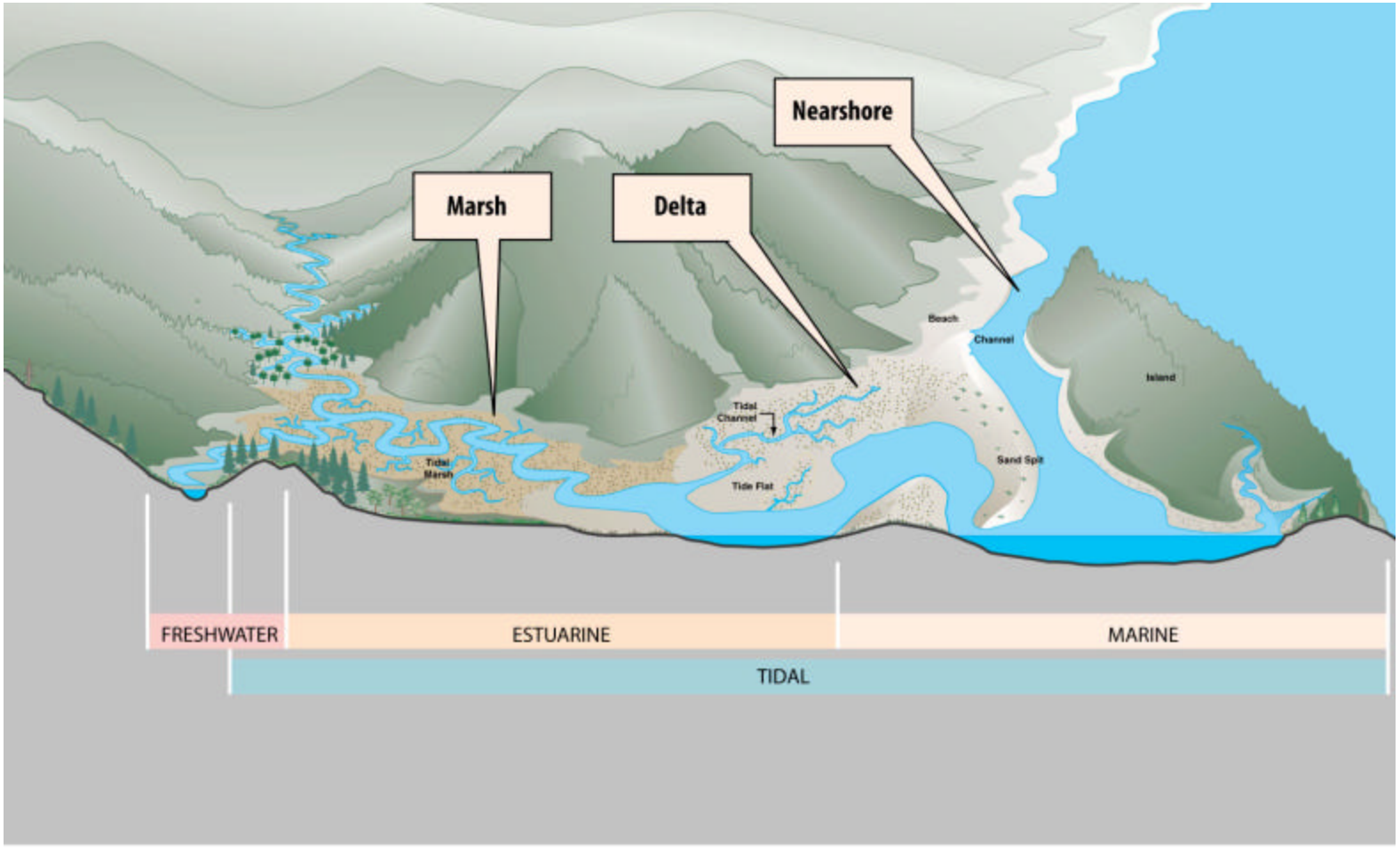
- **Eutrophication – the natural aging process**
- **Sedimentation – soils eventually fill the lake**

Watersheds and Lakes

- **A lake reflects its watershed so lake management must include watershed management.**



The Nearshore



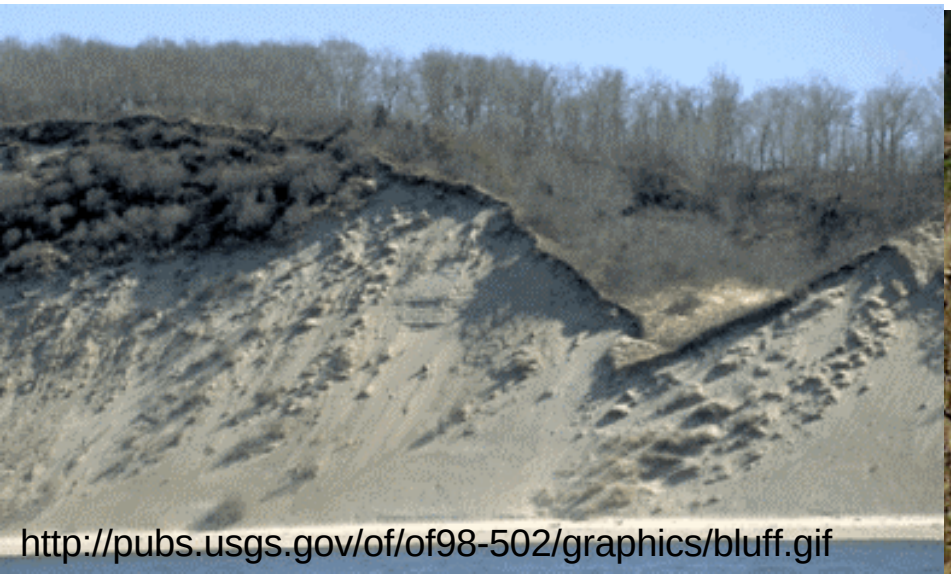
Produced by: Visual Communication & Web Unit, King County Department of Natural Resources
File Name: 0401 LgRiverMouth_NrshrSlide.ai

King County
Department of Natural Resources and Parks

Nearshore Habitat Types

Differ widely based on

- Wave action
- Substrate
- Topography & Geography
- Shoreline inputs

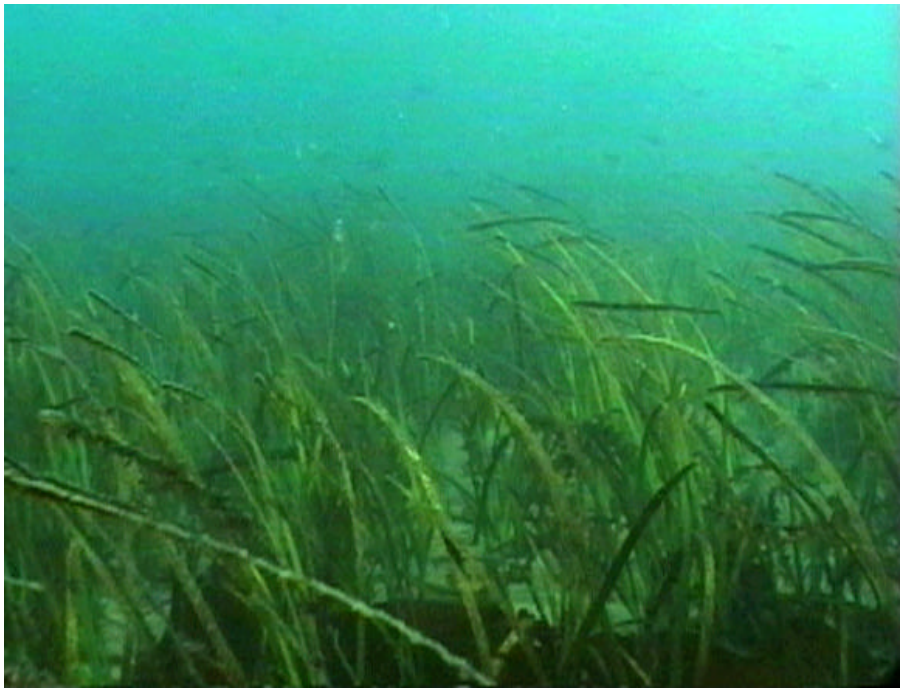


http://pubs.usgs.gov/of/of98-502/graphics/bluff.gif

Photo by Paul Racette, WSU Extension King County

Functions and Values of Nearshore

- Shoreline erosion protection
- Water pollution filtration
- Flood mitigation
- Nutrient-rich nursery
- Spawning, rearing, and feeding ground for numerous species
- Critical juvenile salmon nursery

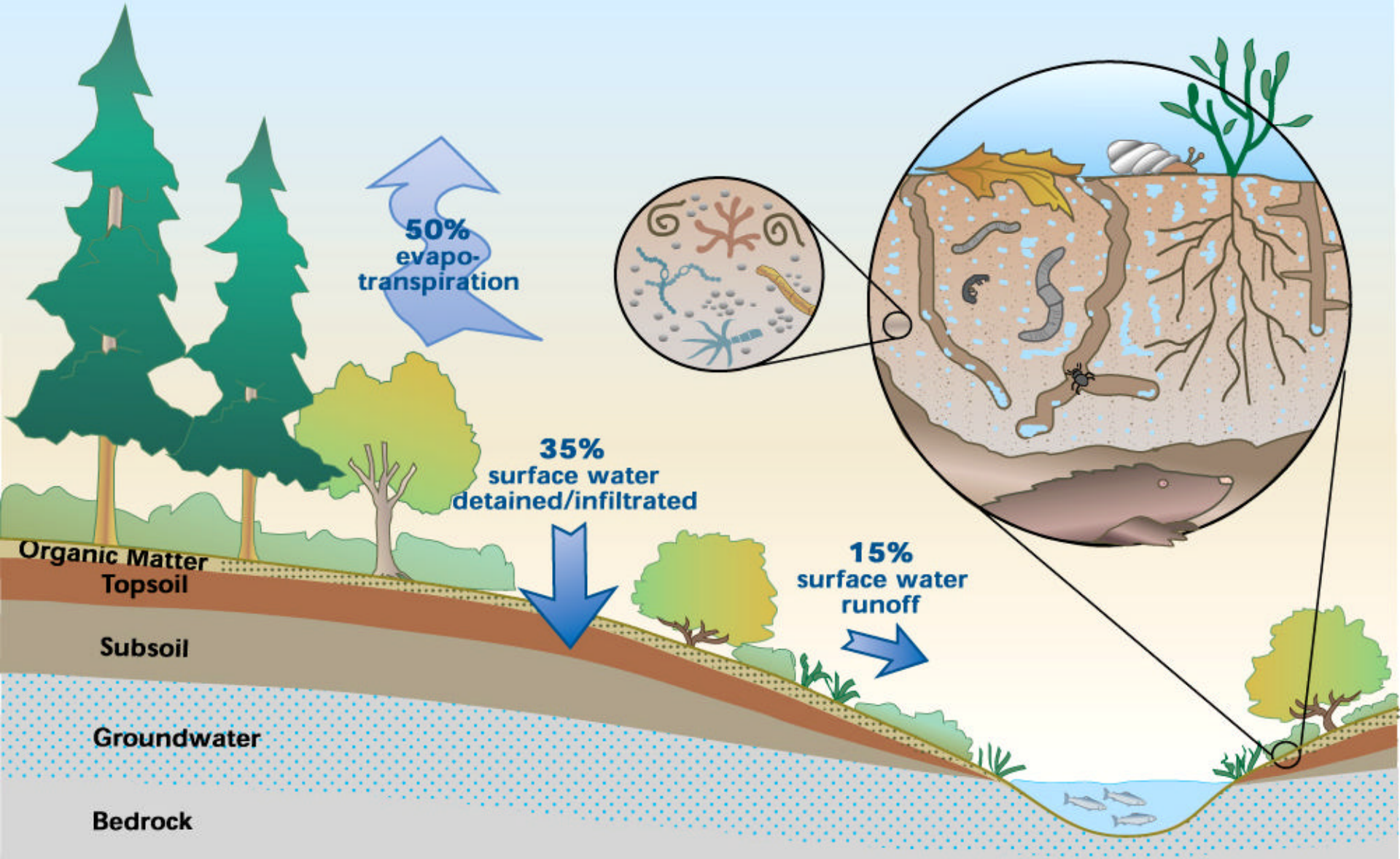


http://dnr.metrokc.gov/wlr/waterres/marine/img/vegetation/eelgrass2.jpg

Forests and Vegetation

- Role in the water cycle
- Water quality and quantity
- Fish and other wildlife
- Role of native plants

Hydrology in a forest environment



Forests role in the water-cycle:

- Interception
- Evaporation
- Transpiration
- Percolation

Forest affect water quality by:

- Filtering nutrients and sediment
- Providing shade, which keeps temperatures cool
- Providing large woody debris (LWD)
- Stabilizing soils and stream channels

Forests help create habitat for fish

Native Vegetation

- Plant species present in Pacific Northwest prior to European arrival, circa 1800
- Plants that evolved locally and are adapted to local habitat types

Functions and Values of Native Vegetation

- Evolved with native pests
- Erosion control
- Slope stabilization
- Water filtration (wetland species)
- Food and shelter for native wildlife


Photo by Darla, LWS


Photo by Darla, LWS

WASHINGTON STATE UNIVERSITY
EXTENSION
World Class. Face to Face.

Wildlife and Watersheds




Types of Wildlife

- Amphibians
- Reptiles
- Birds
- Mammals
- Fish

It's All About Habitat

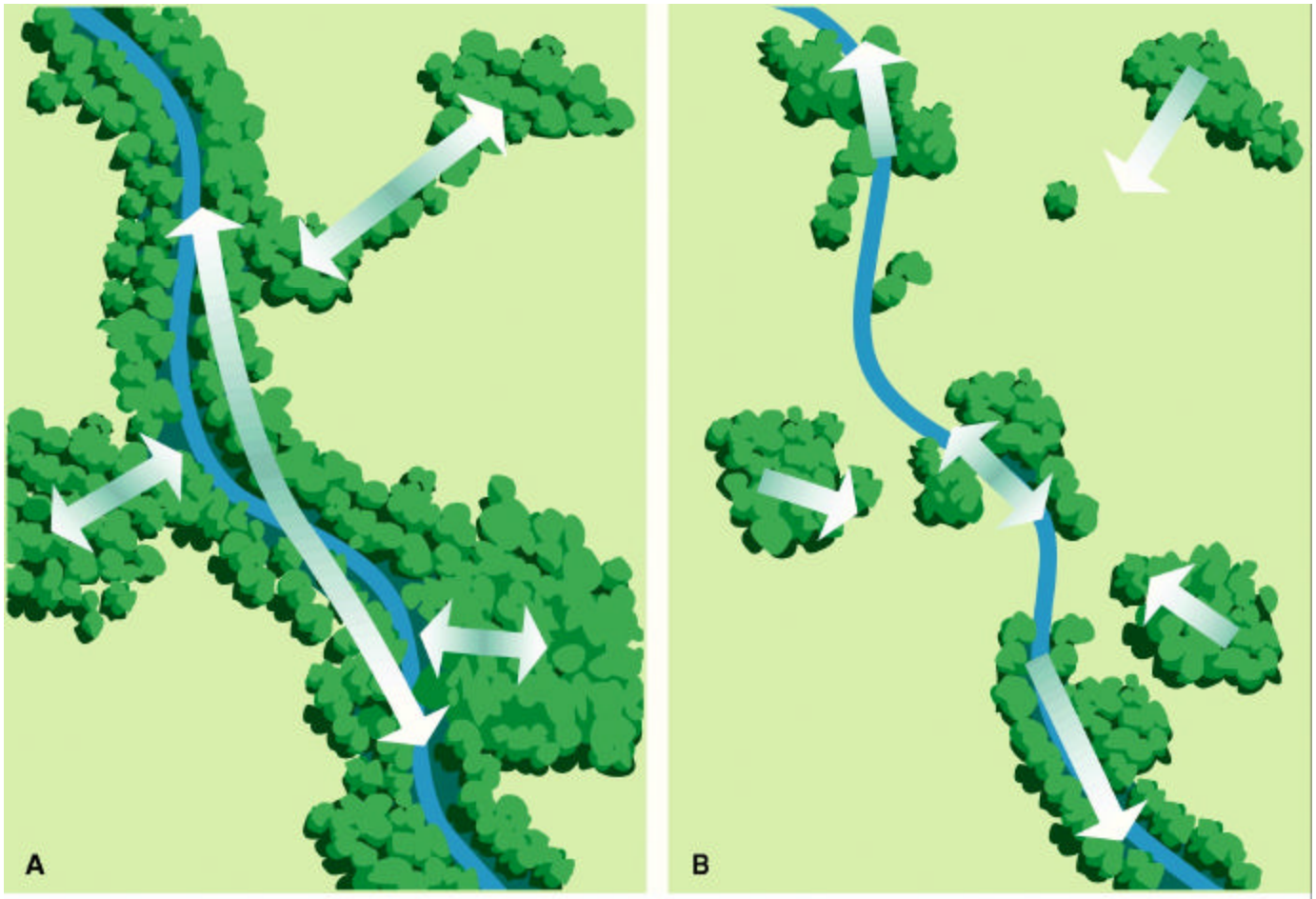
- Food
- Water
- Shelter
- Space



Riparian Areas

- Many species require riparian habitat
- Diversity
- Refugia
- Corridors

Stream Corridor Connectivity



Important Fish Habitat Needs

- Good water quality
- Cool well oxygenated waters in spawning gravels
- Habitat Structures
  - Pools (escape-cover)
  - Riffles(spawning)
  - Undercut banks/woody debris (cover and food)
- Riparian vegetation (shade, insect and leaf drop)
- Absence of migration barriers